Book of abstracts

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Challenges and opportunities on the use of biofertilizers: Examples from Senegal and Kenya

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Not only phosphorus (P) bioavailable in soil is very low but phosphate fertilizing efficiency is also low. Consequently, annual world P demand increases predicting phosphorus stock end in the coming 125 years. In addition to that, the high cost of chemical fertilizers obliges most Sub Sahara African smallholder farmers to do not use fertilizers which ultimately results in poor yields. In this paper, we present opportunities and challenges of using bio fertilizers as sustainable way of alleviating soil P deficiency effects in Kenya and Senegal. In Kenya where soil P deficiency has been identified as the biggest challenge of crop productivity increases, we share results on the use of commercialized arbuscular mycorrhizal inoculants to replenish soil P. While in Senegal known having huge quantities of P rock deposit and important quantities of feed stock material that can be charred (biochar), we present results on the capacities of biochar to improve P availability for plant cultivated in sandy soil. Results from both countries show that current expectations on the use of bio fertilizers are numerous and justified. However challenges on sustainable agriculture through the use of the called bio fertilizers especially mycorrhizal inoculants and biochar are still ahead.

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Do nitrogen-fixing plants show higher root phosphatase activity on phosphorus-poor soils?

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Symbiotic dinitrogen (N_2) fixation in N_2-fixing plants may enhance plant performance on N-poor soils, but may not be favoured on phosphorus- (P) poor soils, due to its high P costs. Yet surprisingly, N_2-fixing species are abundant in ecosystems with N-rich soils such as lowland tropical rainforests, where P is likely to limit plant growth. A prominent hypothesis seeking to explain this paradox is that N_2-fixing plants have a greater ability to acquire organic P through higher root phosphatase activity. However, evidence to support this hypothesis remains limited. We measured extracellular root phosphomonoesterase (PME) activity from 18 species of N_2-fixing (including legumes and non-legume *Allocasuarina* spp.) and non-N_2-fixing species along a soil age gradient in Western Australia that shows a ~40-fold decline in total soil [P] from the youngest to the oldest soils, leading to some of the most P-impoverished soils found in any terrestrial ecosystem. In support of the hypothesis, we found that N_2-fixing legumes had higher PME activity than co-occurring non-legumes on all sites, and that the difference in PME activity between legumes and non-legumes increased with declining soil [P]. However, PME activities of N_2-fixing *Allocasuarina* spp. (which form associations with *Frankia*) were consistently low across all soils, which do not support the hypothesis. We conclude that the high root phosphatase activity of legumes on P-poor soils is likely a phylogenetically conserved trait that is not necessarily linked to their N_2-fixing ability.